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A Review of North American *Belomicrus* (Hymenoptera, Sphecidae, Crabroninae)

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Abstract.—The North American *Belomicrus* are reorganized into five groups containing a total of 40 species. Of these, 14 are described as new: *californicus* (central Sierra of California), *costalis* (central California), *darwini* (sw. U.S.); *desertus* (s. California); *inyo* (Inyo Co., California), *longiceps* (sw. U.S.), *melanus*, (central Sierra of California), *montanus* (central Sierra of California), *oraibi* (Arizona and s. Utah), *pallidus* (s. California), *powelli* (coast range mts. of California), *siccatus* (s. California), sierrae (central Sierra of California), *texensis* (Texas and Baja California Sur). Keys, illustrations, and distributions are given. New synonymy: *quemaya* Pate is raised to full species; and *jurumpa* Pate is synonymized under *quemaya*.

Belomicrus Costa (1871) is one of several crabronine genera in the tribe Oxybelini. Bohart and Menke (1976:359-370) gave an overview of present day knowledge of the tribe. They pointed out that the presence of metanotal projections (squamae) and a propodeal projection (mucro) in addition to a lateral carina on terga I-III, and sometimes IV-V, characterize *Belomicrus*. As far as known, distribution of the genus is holarctic and Ethiopian. Bohart and Menke listed 63 species of which 25 were North American. I now recognize 40 species in the latter region, of which 14 are new.

Among earlier writers the work of Pate (1940a,b) was outstanding. His overall assessment of *Belomicrus* and its relatives was brilliant, and his descriptions were meticulous. The only criticisms that can be made are that some of his phylogenetic discussions suffered from lack of material, and his descriptions contain much detail irrelevant at the species level.

Belomicrus are ground-nesting wasps, mostly in sandy areas. Prey of the *forbesii* group are nymphal Miridae (Bohart 1956, Evans 1969). The *franciscus* group provisions with adult dasytid beetles (Williams 1936, Bohart and Menke 1976). Prey of the other groups are unknown.

Members of the genus are few in most collections. Through museum visits and borrowings I have been able to examine about 600 specimens. The majority of these are in the University of California at Riverside museum and were collected by P. H. Timberlake. Diligent work by Bohart Museum collectors at Davis has made some 3,000 more specimens available for study.

Principal cooperating museums and individuals are listed below. Museum designations are identified by their city locations in capital letters.

The manuscript was read by Dr. Arnold Menke and Dr. Eric Grissell. Their comments and corrections were quite helpful, and their assistance is gratefully acknowledged.

BERKELEY—J. Powell, P. D. Hurd (deceased), Essig Museum, University of California at Berkeley.

DAVIS—L. S. Kimsey, S. Heydon, Bohart Museum, University of California at Davis.

LOGAN—G. E. Bohart, Entomology Museum, Utah State University.

NEW YORK—J. Rozen, Entomology Museum, American Museum of Natural History.

OTTAWA—L. Masner, Biological Resources Division, Agriculture Canada.

PHILADELPHIA—S. Roback, Daniel Otte, D. Azuma, Academy of Natural Sciences.

RIVERSIDE—P. H. Timberlake (deceased), S. Frommer, Entomology, Museum, University of California at Riverside.

SAN FRANCISCO—W. J. Pulawski, P. Arnaud, Entomology Museum, California Academy of Sciences.

VIENNA—M. Fischer, Naturhistorische Museum, Vienna, Austria.

WASHINGTON—A. S. Menke, K. V. Krombein, U.S. National Museum.

Terms used in the species key and in descriptions which may need explanation are: epipleural "button", small raised area just behind pronotal lobe; T-I, T-II, etc. terga after propodeum; S-I, S-II, etc., sterna after propodeum; LID, least interocular distance; PD, puncture diameter; post-tegula, basal wing sclerite.

The generotype, *Belomicrus italicus* A. Costa (1871), has a palearctic distribution and is similar to species in the *forbesii* group. However, it should be placed in a different group because the clypeus has a considerable flattened area on the median lobe, and the more posteriorly blunt metanotal projection is divided by a median carina.

The ten groups of North American *Belomicrus* which Pate (1940b) proposed are now reduced to five. Bohart and Menke (1976) considered only 2 groups, *forbesii* and *cladothricis*. With the discovery of additional species it now seems desirable to divide the *forbesii* group into four according to the following key.

The purpose of this and other keys in the paper is to give a quick means of making identifications. It is understood that the key user should have access to at least a representative named collection of *Belomicrus* for comparative purposes.

KEY TO THE SPECIES GROUPS OF NORTH AMERICAN *BELOMICRUS*

1	Metanotal projections (squamae) divided into two distinct lobes (Figs. 28-43), basally joined or separated but without an outer membranous area; body rarely more than 4mm long; postocular tubercles well defined; (Figs. 18-24)	***cladothricis*** group
—	Metanotal projections joined to form a roughly triangular plate with a posterior notch and an outer partly membranous edge (Figs. 11-14), postocular tubercles various	2
2	Mandible of females and some males with an obtuse angle subapically on lower edge (Fig. 15), mesopleuron with an omaulus	***vanyume*** group
—	Mandible with at most a slight inferior angle subapically, mesopleuron without omaulus	3
3	Clypeus with an anchorlike apical projection in female (Fig. 16), body about 2 mm long	***apache*** group
—	Clypeus simply pointed or with a deflected apical bevel, body 3.5 mm long or more	4
4	Clypeus medially hoodlike, often somewhat wrinkled, not deflected apically but ending in a small point (Fig. 17)	***forbesii*** group
—	Clypeus with an apicomedial polished triangle or deflected bevel (Figs. 3-7)	***franciscus*** group

Belomicrus forbesii group

The only previous key to the *forbesii* group is that given as part of a more extensive one by Pate (1940b:210). The *forbesii* part was based on about 65 specimens, of which some 43 were forbesii and *columbianus*, 10 were *cookii*, seven were *penuti* (as a subspecies of *forbesii*), 3 were *coloratus*, and two were *querecho*. I have studied about 1,500 specimens of the group.

Instead of the six now valid species recognized by Pate, this figure has been raised to 10, which includes four new species.

Members of the *forbesii* group have relatively few "structural" differences. However, the coloration and color patterns seem to be quite constant in long series. Therefore, I am treating *columbianus* as distinct from *forbesii*, *sierrae* as distinct from *penuti*, and *desertus* as distinct from *cookii*. Details on differences are given in the key, which follows:

KEY TO THE *BELOMICRUS FORBESII* SPECIES GROUP

1 T-I with basal slope all or mostly red 2
— T-I with basal slope dark reddish brown, dark brown, or black 5
2 Postocular tubercles weak and obtuse, tergal pale yellow bands usually well developed on T-I and often on T-II, weak or faint on T-III and following ..... ***montanus*** R. Bohart
— Postocular tubercles well developed, tergal markings various 3
3 S-II and following with distinct, close, moderately fine punctures; S-II with a broad median depression ..... ***querecho*** Pate
— S-II and following with indistinct, close, fine punctures or other microsculpture; S-II with at most a median flattened area 4
4 Terga without distinct pale yellow bands, these sometimes faintly visible; band across pronotum nearly always broken a little inside pronotal lobe, wing membrane stained ..... ***powelli*** R. Bohart
— Terga with distinct pale yellow bands on most terga, band across pronotum complete to pronotal lobes, wing membrane nearly clear ..... ***desertus*** R. Bohart
5 Epipleural "button" cup shaped, cup usually with a membranous outer edge, or pronotal collar all black 6
— Epipleural "button" not cup shaped, only slightly indented, pronotal collar nearly always maculate 7
6 Pronotal collar all black, T-I to IV all dark or with indistinct bands, epipleural "button" pocket without a lighter colored edge, postocular tubercles weak ..... ***sierrae*** R. Bohart
— Pronotal collar maculate, terga with pale bands or lateral spots usually on T-I to V, epipleural "button" pocket deeper and with a lighter colored edge, postocular tubercles often well developed ..... ***penuti*** Pate
7 Tergal markings weak, pale bands indistinct at least on T-III to V; pronotal collar black laterally and sometimes medially ..... ***columbianus*** (Kohl)
— Tergal markings prominent; pronotal collar nearly always completely banded 8
8 T-I, II and sometimes III in female with dark ground color, following terga with red ground color; both sexes with small but sharp postocular tubercles ..... ***cookii*** Baker
— T-I and most following terga in both sexes with reddish brown to black ground color; both sexes with at most weakly to moderately developed, but not sharp, postocular tubercles 9
9 Tergal coloration in front of yellow bands brownish red or reddish brown, postocular area without definite tubercles ..... ***coloratus*** Baker
— Tergal coloration in front of yellow bands dark brown to nearly black, postocular area nearly always with low but definite tubercles ..... ***forbesii*** Robertson

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Belomicrus coloratus Baker

Belomicrus colorata Baker 1909:29. Holotype female, Ormsby Co., Nevada (DAVIS), examined.

I have studied 422 males and 140 females from Nevada and California. They were all taken in the months of June and July at elevations of 4,000 to 8,000 feet. Nevada county records include Ormsby, Douglas, and Eureka. California counties are Alpine, El Dorado, Inyo, Lassen, Mono, Nevada, Placer, Sierra, and Tuolumne. A single Oregon record is 5 mi e. Bly, Klamath Co.

The principle diagnostic features, especially the tergal markings, are given in the key.

Belomicrus columbianus (Kohl)

Oxybelus columbianus Kohl 1892:208. Lectotype female (examined and here designated), Revelstoke, British Columbia (VIENNA). Treated as a subspecies of *forbesii* by Bohart and Menke (1976). New status.

Oxybelus larimerensis Rohwer 1908:417. Holotype female, Larimer Co., Colorado (WASHINGTON), examined. Treated as a synonym of *forbesii* by Bohart and Menke (1976). Revised synonymy.

In all, 54 males and 69 females have been studied. These were taken during the months of May (rarely), June, July, and August, mostly at elevations above 4,000 feet. Western state records include British Columbia, Alberta, Colorado, Idaho, Montana, Nevada, Oregon, Utah, and Washington. California records are: Bell Echo Camp,

Dorris, and Rattlesnake Meadow, Siskiyou Co.; Morrison Meadow and Snowslide Park, Trinity Co.

The new status of *columbianus* and its synonym, *larimerensis* is indicated by the difference in markings from *forbesii* as outlined in the key.

Belomicrus cookii Baker

Belomicrus cookii Baker 1909:29. Lectotype male, Claremont, Los Angeles Co., California (WASHINGTON). Lectotype designated by Pate (1940a).

This species is known from a few southern California localities. I have seen 8 males and 11 females from Los Angeles Co. (Claremont, Newhall) and Riverside Co. (Riverside, Gavilan), all taken during the months of April and May at low elevations in foothill locations.

Belomicrus desertus R. Bohart, new species

Female holotype.—Length 5 mm. Black, red are: clypeal apex, foretarsus partly, tegula dully, terga mostly, sterna except for dark median blotches on T-I to T-III; whitish yellow are: mandible basally, scape partly, flagellum beneath, apical spots on femora, tibiae outwardly, squamal triangle, apical bands on T-I to III, weak on IV-V; wings nearly clear. Pubescence moderate, silvery and appressed on clypeus, lateral frontal band enlarged above, short supraclypeal spot, postocular, mesopleural, and lateral tergal areas moderately silvered. Punctation fine and close, a little shiny across frons below ocelli; pygidial plate with coarse, separated punctures. Postocular tubercles well developed, epipleural "button" weakly indented.

Male.—Length 4-5 mm. Whitish yellow are: mandible mostly, clypeus across apex, basal tarsal segment, apical bands on T-I to VII (usually).

Holotype female (DAVIS), 3 mi s. Kramer Junction, San Bernardino Co., California, IV-6-66 (R.M. Bohart). Paratypes, 123 males, 31 females topotypical, collected in April of various years by R.M. Bohart, E.I. Schlinger, M.E. Irwin, D.S. Horning, J.C. Hall, F.D. Parker. Other paratypes from San Bernardino Co., California: 3 males, 5 females, Joshua Tree National Monument, (H.K. Court); 13 males, 4 females, Adelanto (E.I. Schlinger, *et al.*): 6 males, 2 females, Apple Valley (W. R. Mason, P. D. Hurd). Other specimens (not paratypes) were from California counties: San Bernardino (Victorville, Morongo Valley, Red Mountain), Imperial (Palo Verde), Los Angeles (Llano, near Lovejoy Buttes), Ventura (Chuchupate Ranger Sta., Frazier Mt.), Kern (Dove Well), *inyo* (Panamint Mts., 8 mi w. Brown). Paratypes in cooperating museums.

This species is similar to *powelli* which also has well developed postocular tubercles, the basal slope of T-I red, and the epipleural "button" scarcely indented. However, *desertus* usually has extensive whitish yellow tergal markings. Sometimes, these may be on T-I only. See also *powelli*.

Etymology.—specific name derived from Latin adjective, *desertus* = abandoned.

Belomicrus forbesii (Robertson)
Figs. 12, 17

Oxybelus forbesii Robertson 1889:85. Holotype male, Colorado (PHILADELPHIA), examined.

I have studied 118 males and 122 females, collected from May to August at elevations of 4,000 to 10,000 feet in the following states and counties: California (Alpine, Lassen, Modoc, Mono, Nevada, Sierra, Siskiyou, Trinity), Colorado (Larimer, Denver), Montana (Missoula), Nevada (Elko, Pine, Washoe), Utah (Box Elder, Kane, Summit), and Wyoming (Sublette, Teton, Uinta). Female face (Fig. 17).

Diagnostic characters, particularly the abundant tergal markings, are given in the key.

Belomicrus montanus R.Bohart, new species

Female holotype.—Length 5 mm. Black, red are: clypeal apex, terga and sterna mostly except for dark blotches on S-I-II; whitish are: mandible basally, scape apically, flagellum beneath, pronotal collar and lobe, apical spot on forefemur, tibiae outwardly, squamal triangle, T-I apex faintly; wings lightly stained. Pubescence light, silvery and appressed on clypeus, lateral frontal area, short supraclypeal spot, postocular and mesopleural areas moderately. Punctation fine and close, not shiny across frons below ocelli; pygidial plate with coarse, separated punctures. Postocular tubercles quite weak, epipleural "button" slightly indented.

Male.—Length 4-4.5 mm. Foretarsus partly

off-white, T-I whitish apically.

Holotype female (DAVIS), White Mts., Mono Co., California, 10,000 ft., VII-10-68 (R.M. Bohart). Paratypes, 14 males, 13 females, topotypical but collected from June 22 to July 23 by J.W. MacSwain, J. Powell, and G.I. Stage. Other California paratypes: 1 pair, Benton, Mono Co., V-23-86 (R.M. Bohart); 3 males, Westgard Pass, Inyo Co., V-VI-37 (G.A. Hamsher, C.D. Michener); 2 females, Deep Springs, Inyo Co., V-13, V-14 (L.D. French, N.J. Smith). Paratypes in cooperating museums as far as possible.

There is some similarity to *querecho*, *powelli*, and *desertus*, since the basal slope of T-I is mainly red, and the epipleural "button" is scarcely indented. From all three of these the weakly indicated postocular tubercles of *montanus* are differentiating. Also, it may be separated from *querecho* by the distinct sternal punctation of the latter, as well as its broad depression on S-II.

Etymology.—specific name derived from Latin adjective, *montanus* = dwelling on mountains.

Belomicrus penuti Pate

Belomicrus forbesii penuti Pate 1940:27. Holotype male, Yosemite Valley, Mariposa Co., California (PHILADELPHIA). Raised to species status by Bohart and Menke (1976).

The 1,115 males and 51 females I have studied were collected during April to September in California and neighboring Nevada at elevations mostly above 5,000 feet. California counties are: Alpine, El Dorado, Fresno, Lassen, Mariposa, Mono, Nevada, Placer, Calaveras, Sierra, Tulare, Amador, and Tuolumne. Nevada records are Incline Village and Little Valley, Washoe Co. Also, Pate (1940a:28) recorded *penuti* from southern Oregon: Crater Lake and Lake of the Woods, Klamath Co. I have not studied these specimens.

The relationships to *columbianus* and *forbesii* are outlined in the key.

Belomicrus powelli R. Bohart, new species

Female holotype.—Length 5 mm. Black, red are: clypeal apex, terga and sterna mostly except for dark blotches on S-II-III; whitish are: mandible basally, flagellum beneath, pronotal collar medially, pronotal lobe, apical spot on femora, tibiae outwardly, foretarsus dully, squamal triangle; wings moderately stained. Pubescence silvery appressed on clypeus, lateral frontal area, stout supraclypeal triangle, postocular and mesopleural areas (weakly). Punctation fine and close, not shiny across frons below ocelli, somewhat shiny on terga; pygidial plate with coarse, separated punctures. Postocular tubercles well developed, epipleural "button" slightly indented.

Male.—Length 4-4.5 mm. Characters about as in female. Scape whitish at apex.

Holotype female (SAN FRANCISCO), La Panza, 12 mi ne. Pozo, San Luis Obispo Co., California, IV-29-62 (J. Powell). Paratypes, 5 males, 16 females (all from California collected in April and May): Monterey Co.: 1 male, 5 females, Hastings Reserve (D.L. Linsdale); 1 pair, Arroyo Seco (D. Burdick, P. Torchio); female, 12 mi n. Cholame (D.H. Janzen); San Luis Obispo Co.: 2 pair, topotypical (J. Powell, R.W. Thorp); female, 5 mi ne. Santa Margarita (R.W. Thorp); Fresno Co.: 12 mi w. Coalinga (J.W. MacSwain); Ventura Co.: 3 males, 8 females, Chuchupate Ranger Sta., Frazier Mt. (J. Powell, P.D. Hurd). Paratypes in SAN FRANCISCO, DAVIS.

The well developed postocular tubercles are also found in *desertus*, which see. The all red terga and broken yellow pronotal band of *powelli* are distinguishing. Although primarily a coastal form, *powelli* occurs with *desertus* on Frazier Mt., Ventura Co., at Chuchupate Ranger Station. In fairly long series the differences given in the key seem to hold. The species is named for my friend, Jerry Powell, a lepidopterist who has also worked with wasps.

Belomicrus querecho Pate

Belomicrus querecho Pate 1940:36. Holotype male, Alamogordo, Otero Co., New Mexico (PHILADELPHIA), examined.

This southwestern species is largely restricted to the Chihuahuan Life Zone. I have studied 3 males and 20 females, collected in April, May, and June in the following states: Arizona (near Apache and Willcox, Cochise Co.; Tubac, Santa Cruz Co.; Oak Creek Valley Road, Yavapai Co.; 10 mi w. Jacob Lake, Coconino Co.). Utah (25 mi s. Moab, Grand Co.). New Mexico (Skeleton Canyon, Peloncillo Mts., and Rodeo, Hidalgo Co.;

Alamogordo, Otero Co.; 5 mi e. Las Cruces and Leasburg Dam, Dona Ana Co.). Nevada (4 mi s. Warm Springs, Nye Co.) and Texas (Rankin, Upton Co.).

Belomicrus sierrae R. Bohart, new species

Female holotype.—Length 5 mm. Black or dark brown, red are: flagellum beneath dully, foretarsus dully, apical half of pygidial plate; whitish yellow are: mandible basally, femorotibial joints, tibiae outwardly, apicomedial spot on squamal triangle (all yellow in some paratypes); wings moderately stained. Pubescence silvery appressed on clypeus laterally, narrowly on lateral frontal area, short supraclypeal spot, weakly on postocular and mesopleural areas. Punctation fine, close, dull; clypeus wrinkled, with a pair of coarse punctures above polished apex, pygidial plate with coarse, separated punctures. Postocular tubercles present but weak, epipleural "button" deeply indented but not covered with a thin membrane; lateral propodeal carina flattened, somewhat bent inward.

Male.—Length 4.5-5 mm. About as in female. Pronotal lobe sometimes dully pale.

Holotype female (DAVIS), Sagehen Creek, Nevada Co., California, 6,500 feet, VI-25-68 (R.M. Bohart). Paratypes, 118 males, 97 females, topotypical, V-29 to VII-25 (R.M. Bohart, J.A. Skinner, L.S. Kimsey, M.E. Irwin, D.S. Horning, J.E. Slansky, J. Powell, B. Villegas). Also paratypes, 10 males, 19 females, Grass Lake, El Dorado Co., California, 8,000 ft., VII-5-62 and VII-16-62 (R.M. Bohart *et al.*). Other specimens (not paratypes) have been studied from other California counties at 6,000 ft. or above: Alpine, Calaveras, Plumas, Lassen, Placer, and Trinity. Paratypes in all cooperating museums.

The dark basal slope of T-I and the deeply indented epipleural "button" ally *sierrae* with *penuti*. However, the "button" is not as thinly lidded above as in *penuti*. Futhermore, the latter seems always to have at least several of the terga with whitish bands. The dark abdomen of *sierrae* is similar to that of *columbianus*, and conceivably the two species might occur together in California near the Oregon border. In addition to the epipleural "button" difference, *columbianus* has the lateral propodeal carina simple, whereas in *sierrae* it is not sharp but flattened and bent inward.

Etymology.—the specific name refers to the California Sierra.

Belomicrus apache group

The *apache* group contains only the single known species, *apache* Pate. It was described in detail from a single female by Pate (1940a) and placed in a key by Pate (1940b). This is one of the smallest known *Belomicrus*, approximately 2 mm in length. The female has a peculiar anchoriform terminal process figured by Pate (1940a) and herein (Fig. 16). The male clypeus is more ordinary. Features of the group are characterized in the key. A brief description of the species, including the previously unknown male, and additional locality records follow:

Belomicrus apache Pate
Figs. 13, 16

Belomicrus apache Pate 1940a:15. Holotype female, Las Cruces, Doña Ana Co., New Mexico (PHILADELPHIA), examined

Female.—Length 2 mm. Black with red unbanded abdomen; legs partly whitish yellow, frons at narrowest point about equal to eye breadth, clypeus with an apical anchoriform projection (Fig. 16), no postocular tubercles or omaulus, squamal triangle translucent laterally, deeply incised posteriorly (Fig. 13).

Male.—Length 2 mm. Much as in female but LID slightly greater and clypeal bevel triangular rather than anchoriform.

I have seen three males and seven females from the following western states: New Mexico (Las Cruces, Doña Ana Co.; Rodeo, Hidalgo Co.), Arizona (Aztec, and 7 mi s. Quartzite, Yuma Co.; Quijotoa and Sells, Pima Co.; Willcox, Cochise Co. on *Euphorbia* mat), California (Cathedral City, Riverside Co. on *Euphorbia polycarpa*). Collections were made from August to October.

Belomicrus vanyume group

The *vanyume* group consists of three species of which one is described below as new. Pate (1940a, b) placed *vanyume* in a monotypic group of its own. The *vanyume* group, as I consider it, is unified by the distinct omaulus running vertically along the widest point of the mesopleuron, and ending

in a tooth or angle. This is followed halfway to the midcoxa by another tooth. Females have the forefemur right-angled subbasally. Except for *vanyume*, males also have this feature. Further, females have the mandible broadened before the apex (Fig. 15).

KEY TO SPECIES OF THE *BELOMICRUS VANYUME* GROUP

1	Postocular area a little swollen but not tuberculate, clypeus broadly rounded, scape light yellow, squamal unit with windowlike clear areas	***vanyume*** Pate
—	Postocular area with prominent tubercles, clypeus with a longitudinal raised area medially, scape dark, squamal unit various	**2**
2	Pronotum all dark, mesopleuron completely punctate and dull, clypeus (as seen in side view) not dentate above bevel, T-II to V or III to V black	***texensis*** R. Bohart
—	Pronotum usually partly whitish, pronotal lobe white, clypeus ending above bevel in a forward-directed tooth (Fig. 15), T-I to V usually red, especially in females	***maricopa*** Pate

Belomicrus maricopa Pate
Figs. 14, 15

Belomicrus maricopa Pate 1947:54. Holotype female, Higley, Maricopa Co., Arizona (WASHINGTON), examined.
Belomicrus mariposa Pate 1947:55. In error.

I have seen 44 males and 58 females from Arizona (Higley, Willcox, 28 mi s. Quartzite, Picacho Canyon), New Mexico (5 mi e. Las Cruces, 9 mi n. Cotton City), California (18 mi w. Blythe, Palo Verde), and Sonora, Mexico (Guaymas).

This species is similar to *texensis*, described below and differences enumerated. The undescribed male is much like the female but is a little smaller and the mandible is somewhat less expanded. Also, the last few terga are darker. The principal differences between the two species are the shinier mesopleuron and apically toothed clypeus of *maricopa* (Fig. 15).

Belomicrus texensis R. Bohart, new species

Female holotype.—Length 5 mm. Black, light yellow are basal two-thirds of mandible, foretibia outwardly; brownish are: legs partly; reddish are: forefemur at base, T-I to III; wings clear, veins mostly orange. Silvery appressed pubescence on clypeus mostly, broad patch along eye margin reaching up as far as an imaginary line drawn across beneath midocellus, short but large supraclypeal patch. Punctation of mesonotum and interocellar area coarse and separated by 1-2 PD of microsculpture, mesopleuron similar but rugose below, tergal punctation moderate and a little shiny, coarse on pygidial plate. LID about 1.7x scape length, clypeus with median raised area bearing longitudinal depression, clypeal bevel transverse and nearly linear, frontal groove well impressed, postocular tubercles well developed, gena in side view bent outward at middle below, mandible strongly expanded at distal one-third, front dorsal margin of pronotum obtusely cornered, squamal unit as in Fig. 14, forefemur rightangled near base, pygidial plate narrowly triangular.

Male.—Length 4 mm. Legs mostly brownish red, forewing veins dark, clypeal bevel broadly triangular, T-I-II red, III a little red laterally and posteriorly, VII dully red.

Female holotype (DAVIS), Kingsville, South Pasture, Kleberg Co., Texas, VI-16-68 (J. E. Gillaspy). Paratypes, 4 females (DAVIS, NEW YORK), same data as holotype but V-6-67 and V-6-68; on *Ratibida columnaris*; paratype male (SAN FRANCISCO), Mexico: Baja California Sur, e. edge of Sierra Placeres, III-24-84 (W. J. Pulawski).

The large size (for *Belomicrus*!), large postocular tubercles, expanded mandible subapically and all dark antenna are also found in *maricopa*. However, *texensis* has many differences: pronotum all dark,

punctation of mesopleuron and mesonotum much closer and not shiny, female clypeus with a longitudinal flattened and shallowly grooved median ridge, clypeus also without a forward-pointing apical tooth, wing veins of female mostly orange instead of black, marginal cell of forewing somewhat shorter, and T-III to V mostly or all black.

Etymology.—the specific name indicates "of or from" Texas.

Belomicrus vanyume Pate

Belomicrus vanyume Pate 1940a:17. Holotype female, Victorville, San Bernardino Co., California (PHILADEPHIA), examined.

In addition to the type I have seen five males and three females, all from California counties: Riverside (Box Canyon, Thousand Palms), San Bernardino (Apple Valley, Kramer Hills, Adelanto, 11 mi w. Ludlow), Imperial (Fish Creek Mts.), Inyo (Darwin Falls). These were all taken in April, May, and June. The previously undescribed male is much like the female but the last two terga may be dark.

Belomicrus franciscus group

The absence of an omaulus, triangular median squamal complex (Fig. 11), mandible not angled beneath toward apex, and clypeus with an apical deflected bevel or polished triangle, when taken together distinguish the group. I have identified eight species, of which three are herein described as new.

Species characters are the extent of tergal yellow markings, flagellar coloration, pronotal maculation, punctation of the postmandibular area of males, development of the mandibular midtooth, and form of the clypeal apex. Since females may be difficult to distinguish, the following key is based on males.

KEY TO MALES OF THE *BELOMICRUS FRANCISCUS* GROUP

1 Ventral area of head just posterior to mandibular insertion nearly all polished, flagellum relatively short, flagellomeres hardly longer than broad (Fig. 2) 2
— Ventral area of head just posterior to mandibular insertion distinctly but not closely punctate, flagellum various 4
2 Clypeal apex arched (Fig. 5), T-I usually with a subapical yellow band or spot (central California below 3,000 feet) ..... ***costalis*** R. Bohart
— Clypeal apex not much, if any, arched; terga usually all red or with only a narrow streak of yellow on T-I 3
3 Flagellum pale yellow beneath on I-IX or X; mandible tooth on inner margin well developed (Fig. 9); punctures of interocellar area close but not contiguous, area a little shiny (central Sierra of California at 4,000 to 5,000 feet) ..... ***californicus*** R. Bohart
— Flagellum orange beneath before apex; mandible tooth on inner margin small (Fig. 8), punctation of interocellar area contiguous and dull (low elevations in California from San Luis Obispo Co. to San Diego Co.) ..... ***serrano*** Pate
4 Ground color on T-I to T-VI black, tergal markings whitish (central Sierra of California above 5,000 feet) ..... ***melanus*** R. Bohart
— Ground color on T-I to T-III, at least, red; tergal markings pale yellow 5
5 Clypeal bevel produced downward laterally (Fig. 4), terga maculate 6
— Clypeal bevel narrowed laterally, maculation various 7
6 Flagellum unusually long, mostly orange, many flagellomeres longer than broad as viewed laterally (Fig. 1); clypeal bevel often with a small median point (Fig. 4); terga often with yellow spots but rarely with complete yellow bands (desert areas from Inyo Co., California and Clark Co., Nevada south to Sonora, Mexico) ..... ***quemaya*** Pate
— Flagellum rather stout, dark above (Fig. 2), flagellomeres about as broad as long in lateral view; clypeal bevel without a median denticle; terga with complete yellow banding (San Francisco) ..... ***franciscus*** Pate
7 Clypeal apex convex overall, bevel simple below, femora often extensively red (southern California) ..... ***cahuilla*** Pate
— Clypeal apex more nearly flat, bevel margined below by a slight inflection, femora black with a small amount of pale yellow (central Sierra of California at 5,000-7,000 feet) ..... ***mono*** Pate

Belomicrus cahuilla Pate

Belomicrus cahuilla Pate 1940:39. Holotype male, Andreas Canyon, Riverside Co., California (PHILADELPHIA), examined.

The male differs from that of *mono* by the simple and convex clypeal bevel. In the female the bevel is more indented than that in *mono* or *quemaya*. Both sexes have dark median areas on the terga, which may extend all across on T-III and following. Only a single female has been identified, so variation cannot be assessed. The type series of four males came from Andreas Canyon (Palm Springs). I have also seen five males from close by (Taquitz Canyon, F. D. Parker and L. A. Stange). Other southern California records are: male, female, near Cajon Junction, San Bernardino Co. (J. C. Hall, E. I. Schlinger); males, Walker Pass and West Wofford Heights, Kern Co. (J. Powell); male, 2 mi e. Banner, Riverside Co. (H. C. Dickson). Dates of capture ranged from April 16 to June 7 (males), and July 4 (female).

Belomicrus californicus R. Bohart, new species
Figs. 7, 9

Belomicrus franciscus Pate of Bohart, in Bohart and Menke 1976:363. Misidentification.

Male holotype.—length 4.5 mm. Black, whitish are: mandible mostly, scape in front, flagellum beneath except at apex, pronotal collar medially, lobe, squamal unit, tip of mucro, femora distally, tibiae outwardly, foremetatarsus dully; red are: clypeal bevel mostly, abdomen except for median dark blotches on T-III to VI; wings weakly stained. Silvery appressed pubescence along inner eye margin, stout supraclypeal spot, weak pubescence on postocular area, mesopleuron, and terga. Punctation sparse on mostly polished postmandibular area of head venter, fine and close on dorsum of body, a little shiny on interocellar area. Clypeal bevel quite thin (Fig. 7), distinctly darkened laterally; mandibular inner tooth well developed.

Female.—Length 5 mm. Clypeal bevel slightly margined below, mandible (Fig. 9).

Holotype male (DAVIS), Baxter, Placer Co., California, elev. 5,000 ft., VI-16-56 (R. M. Bohart). Paratypes: 18 males, 21 associated females, all from the California Sierra at 4,000 to 5,000 ft. elevation during May to July, in the following counties: Placer (Dutch Flat, Baxter, Colfax), Tuolumne (Strawberry), El Dorado (Pyramid Ranger Station and near Icehouse Road). Collectors were J. G. Rozen, J. W. MacSwain, R. M. Bohart, W. J. Pulawski, and H. M. Kimball Court. Paratypes are deposited in museums listed in acknowledgements.

This species is close to *serrano*. Both have the male postmandibular area practically impunctate, but in *californicus* the mandible tooth is well developed, and punctation of the interocellar area is a little less dense.

J. MacSwain and I observed a large nesting area in 1956 near Pyramid Ranger Station north of Placerville, California. Females were provisioning ground nests with dasytine beetles, *Amecocerus cervicalis* Blaisdell (Melyridae).

Etymology.—the specific name indicates "of or from" California.

Belomicrus costalis R. Bohart, new species
Fig. 5

Male holotype.—Length 4.5 mm. Black marked with whitish yellow: scape and mandible mostly, flagellum beneath, pronotum all across, posttegula, squamal unit, large forefemoral spot, small distal midfemoral spot, tibiae and metatarsi outwardly, subapical band on T-I, attenuate laterad; red are: clypeal bevel, T-I to III mostly, T-IV to VI except for median dark blotches, T-VII, wings weakly stained. Silvery appressed pubescence in strip along inner eye margin, a little expanded above, supraclypeal spot, postocular area and mesopleuron moderately, terga lightly. Punctation sparse on mostly polished postmandibular area of head venter, fine and close on dorsum of body, somewhat reflective on interocellar area. Clypeal bevel somewhat arched (Fig. 5).

Female.—Length 5 mm. Terga all red, scape pale in front only, flagellum reddish yellow beneath. Clypeal bevel flat, not margined below; mandibular inner tooth well developed.

Holotype male (DAVIS), Cache Creek Canyon, Yolo Co., California, IV-30-54 (R. M. Bohart). Paratypes (all from California at low to moderate elevations): male (DAVIS), 4 mi nw. Lake Berryessa, Napa Co., V-12-61 (F. D. Parker); 2 males (DAVIS, WASHINGTON), Sacramento, Sacramento Co., V-19-61 (R. M. Bohart); male (BERKELEY), Alpine Lake, Marin Co., VI-6-57 (J. Powell); 2 males

(DAVIS), Midlake, Lake Co., V-10-56 (E. I. Schlinger); male (BERKELEY), near Quincy, Plumas Co., VI-22-49 (J. W. MacSwain); 2 males (NEW YORK), Tuolumne City, Tuolumne Co., V-30-53 (J. G. Rozen); male (DAVIS), Boca, Nevada Co., VI-19-62 (R. M. Bohart); male (DAVIS), Kyburz Flat, Sierra Co., VII-15-76 (R. M. Bohart); male (DAVIS), Daffodill Hill, Amador Co., VI-5-63 (R. M. Bohart). Also, 6 presumed and associated females from localities listed above: Cache Creek Canyon, Boca, Daffodill Hill, Sacramento.

The band on the pronotal collar is sometimes broken in both sexes. The arched clypeal apex (Fig. 5) differentiates males from *serrano* and *californicus* which agree with *costalis* in having the postmandibular area polished. Females are best distinguished by association with males.

Etymology.—specific name derived from Latin noun, *costa* = side. The species occurs especially on the western side of California.

Belomicrus franciscus Pate
Figs. 2, 3, 11

Belomicrus franciscus Pate 1331:77. Holotype male, Lone Mountain, San Francisco, San Francisco Co., California (PHILADELPHIA), examined.

I have studied several of the type series. The rather stout male flagellum (Fig. 2), extensively yellow-banded terga, and partly punctate male postmandibular area distinguish this species. Female face (Fig. 3). The type series was collected by F. X. Williams (1936) in sandhills of San Francisco. Williams found a colony of the species in late April and early May of 1930. Females were provisioning with *Trichochrous antennatus* Mots. (Melyridae). In all probability the type locality has been taken over by a housing development.

Belomicrus melanus R. Bohart, new species
Fig. 6

Male holotype.—Length 4.5 mm. Black or brown, whitish are: scape in front, mandible mostly, flagellum beneath, pronotum medially, pronotal lobe, post-tegula, squamal unit, tip of mucro, outer distal spots on fore and midfemora, tibiae and foremetatarsus outwardly, subapical band on T-I, weak subapical bands on T-II to VI, apex of VII; dark red: clypeal bevel; wings weakly stained. Silvery appressed pubescence in strip along inner eye margin nearly to level of midocellus, stout supraclypeal spot, postocular area, mesopleuron moderately, terga lightly. Punctation moderate on postmandibular area of head venter, fine and close on dorsum of body, slightly reflective on interocellar area. Clypeal bevel thin all across (Fig. 6).

Female.—Length 5 mm. Whitish bands on T-I-V sometimes better developed in paratypes, pronotum sometimes white all across, pygidial plate partly red. Postmandibular area and rest of head venter polished. Mandibular inner tooth well developed, clypeal bevel thin but impressed over its entire breadth.

Holotype male (DAVIS), Sonora Pass, Tuolumne Co., California, elev. 9,624 ft., VII-6-61 (R. M. Bohart). Paratypes (all from California Sierra at elevations above 5,000 ft.): female, same data as holotype; 3 females, Hope Valley, Alpine Co., VII, 1948, 1978 (R. M. Bohart); male, Fred's Place, El Dorado Co., VII-10-67 (R. M. Bohart); male, Gold Lake, Sierra Co., VII-8-54 (R. M. Bohart). Paratypes all in DAVIS museum.

This species belongs to the subgroup in which males have the postmandibular area somewhat punctate. It differs from other members of the subgroup by the extensively black (rather than red) ground color of the terga. In *cahuilla* the terga may be partly black but the male clypeal bevel is not rimmed above, and the terga are not spotted with whitish yellow.

Etymology.—specific name derived from the Greek *melanos* = black.

Belomicrus mono Pate

Belomicrus serrano mono Pate 1940:46. Holotype female, 5 mi n Round Valley, Mono Co. California (PHILADELPHIA), examined
Belomicrus mono Pate, of Bohart and Menke 1976:363.

The male belongs to the subgroup with punctate postmandibular area on the head venter. The characters given in the key separate it. Females are best identified by association with males.

I have seen 83 males and 65 associated females from 5,000 to 7,000 feet, in the California Sierra of the following counties: Mono (Round Valley holotype), Placer (Lake Tahoe), Sierra (Yuba Pass, Sierra Valley, Independence Lake, Sattley), Nevada

(Sagehen Creek), Glenn (Plaskett Meadows). The Sagehen Creek locality is represented by a long series. Collection dates are mostly in June and July.

Belomicrus quemaya Pate
Figs. 1, 4, 10

Belomicrus quemaya Pate 1940:47. Holotype male, Palm Springs, Riverside Co., California (PHILADELPHIA), examined.
Belomicrus jurumpa Pate 1940:53. Holotype male, Gavilan, Riverside Co., California (PHILADELPHIA), examined. New synonymy.
Belomicrus franciscus quemaya Pate, of Bohart and Menke 1976:363.

The punctate postmandibular area of the head venter in the male places *quemaya* in its subgroup. The unusually long and lightly colored flagellum of both sexes and the distinctive clypeal bevel of the male (Figs. 1, 4) are distinguishing. Wings are nearly clear in both sexes. Females are best identified by association with males. *B. jurumpa* appears to be a simple synonym based on an examination of the holotypes.

I have studied 60 males and 30 associated females collected from March to May. California county records are: Riverside (Whitewater Canyon, Gavilan, Thousand Palms, 18 mi w. Blythe, Palm Springs), San Bernardino (Kramer Jct., Adelanto), Kern (Short Canyon, Iron Canyon), Imperial (Kane Springs, Fish Creek Mts., Palo Verde), Inyo (Mazourka Canyon, Lone Pine), San Diego (Borrego). Other records are Clark Co., Nevada (Searchlight, Jean), and Sonora, Mexico (9 mi e. Kino).

Belomicrus serrano Pate
Fig. 8

Belomicrus serrano serrano Pate 1940:42. Holotype male, Tujunga Wash, San Gabriel Mts., Los Angeles Co., California (PHILADELPHIA), examined.

The polished postmandibular area of the male places the species in the same subgroup as *costalis* and *californicus*. The dull interocellar area and weak mandible tooth (Fig. 8) separate *serrano*. Also, the relatively simple male clypeal bevel, and the indented one of the female are additional characters.

I have seen 46 males and 27 females in addition to the type series. The species is widespread in southern California. The range includes low elevation localities in the following counties: Los Angeles, Riverside, San Bernardino, San Diego, Kern, Ventura, and San Luis Obispo. Collection dates are from March 27 to May 7.

Belomicrus cladothricis group

The deeply divided squamal lobes of the metanotum (Figs. 28-43), and short body length, characterize the group. With the exception of *cladothricis* Cockerell (1895), all previously known species were described by Pate (1940a, 1947). The group appears to be largely confined to western United States, only a few species occurring east of the 100th meridian or in Sonora and the Baja Californian peninsula of Mexico. Considering a small amount of synonymy and the 6 new species described herein, the total number of known species in the group is now 18. In most of these the squamal lobes are separated at the base by dark integument. In some species, however, the pale color and setal texture may be continuous basally, at least in females. These are *cladothricis*, *eriogoni*, and *sechi*.

Species characters of the tiny forms in this group are squamal structure, scutal and interocellar punctation, frons breadth, clypeal bevel details, and the somewhat variable coloration. In one species, *sechi*, the unusual amount of silvery pubescence, and shape of the male scape are distinguishing.

Although little is known about the life history of these species, they are all presumably ground nesting (personal observation of *eriogoni* at Antioch, California), and they are most frequently collected on the flowers of *Eriogonum*. Other flower hosts reported are *Chilopsidis*, *Lepidospartum*, *Euphorbia*, *Cladothrix*, *Cleomella*, *Rhamnus*, *Chrysothamnus*, *Solidago*, *Cercidium*, *Prosopis*, *Sphaeralcea*, *Asclepias*, *Baeria*, and *Salsola*. Because of the small size of species in the *cladothricis* group (2-4 mm long), it can be surmised that they, like many other diminutive sphecids, provision with thrips.

A great deal of descriptive matter on the group was given by Pate (1940a, b, 1947). However, he had a limited amount of material to work with and many of his new species were based on one or two specimens, often of a single sex. His remarks on geographical range must not be taken too literally. For instance, on *timberlakei* he said (1940a:93), "Known at present only from the two specimens

recorded above from Riverside, *timberlakei* will in all probability eventually be found rather widespread throughout the southern piedmont of the Transverse Ranges district of southern California". As I have shown later in this paper, Pate's conclusion was far off the mark.

KEY TO SPECIES OF THE *CLADOTHRICIS* GROUP

1 Scutum partly polished, punctures widely spaced 2
— Scutum with rather close punctation 3
2 Forewing veins normally dark, squamae separated by less than 3x mucro width (Fig. 34) ..... ***mescalero*** Pate
— Forewing veins practically all white, squamae separated by about 4x mucro width (Fig. 33) ..... ***pallidus*** R. Bohart
3 Pronotum all dark including lobe 4
— Pronotum partly whitish, at least on pronotal lobe 6
4 Distance between squamal apices about half length of scutellum (Fig. 35), area between squamae not pointing posteriorly ..... ***timberlakei*** Pate
— Distance between squamal apices at least two-thirds length of scutellum (Figs. 41, 42), area between squamae various 5
5 Area between squamae pointed posteriorly (Fig. 43), scutal punctures moderate and close, terga brown to black ..... ***bridwelli*** Pate
— Area between squame truncate (Fig. 41), scutal punctation quite coarse, T-I or T-I-III with some red ..... ***potawatomi*** Pate
6 Squamae relatively long and angled inward so that apices are not or hardly farther apart than width of mucro (Figs. 37, 39, 40), LID 1.3x to 1.6x length of scape 7
— Squamal apices not unusually long or angled inward, apices farther apart than width of mucro, LID various 9
7 Scutal punctation fine and close, not reflective, interocellar area likewise, T-I not yellow spotted or banded, LID 1.4-1.5x length of scape ..... ***pachappa*** Pate
— Scutal punctation a little uneven, some punctures medium fine; surface reflective, interocellar area likewise, tergal markings and LID various 8
8 Scutal and interocellar punctation a little more coarse and distinct, terga without yellow markings ..... ***tuktum*** Pate
— Scutal and interocellar punctation a little finer and less distinct, T-I or T-I-II often with yellow markings ..... ***istam*** Pate
9 Abdomen black; squamae slender, crescent shaped (Fig. 22), scutal punctation medium coarse with polished interspaces of 1 PD or more; scape whitish, flagellum partly pale beneath; pronotal collar whitish all across; tibiae and tarsi whitish ..... ***vierecki*** Pate
— Abdomen with some pale markings or at least with T-I usually somewhat reddish, squamae not so crescent shaped, scutal punctation with microsculptured interspaces, antenna and pronotal collar various, tibiae and tarsi various 10
10 Head unusually long and narrow (Figs. 21, 24), inner eye margins nearly parallel below ocelli, postocular tubercles prominent and sharp, female genal area depressed and densely silvery below (genal carina undeveloped), frontal groove extending below broadly rounded brow, hindtibia and hindmetatarsus all whitish outwardly 11
— Head not unusually long and narrow (Figs. 18, 20), inner eye margins more strongly curved, female genal area not depressed, frontal groove and leg markings various 12
11 Flagellum extensively pale beneath, forewing veins mostly pale, T-I to III (male) or T-I to VI (female) with prominent whitish bands, squamae somewhat curved but shorter than their interapical distance (Fig. 36) ..... ***oraibi*** R. Bohart

— Flagellum dark beneath, forewing veins mostly brown, T-I-VI unbanded, squamae strongly curved within and longer than their interapical distance (Fig. 38) ..... ***longiceps*** R. Bohart

12. Body with exceptional amounts of silvery pubescence (Fig. 30), interocellar area and vertex silvery setose, propodeum usually extensively red, male scape strongly swollen distally (Fig. 27) ..... ***sechi*** Pate

— Body with moderate amounts of silvery pubescence, interocellar area and vertex not silvery, propodeum black, male scape not swollen **13**

13 Flagellum at least partly lighter colored toward base **14**

— Flagellum practically all dark **16**

14 Flagellum mostly light orange with some dark spots laterally, squamae moderately stout (Fig. 32) ..... ***darwini*** R. Bohart

— Flagellum somewhat lighter toward base beneath; squamae short and stout **15**

15 Interocellar area, vertex, and scutum dull; terga red, at least toward base; female frons length below midocellus 1.6x LID (Fig. 22) ..... ***eriogoni*** Pate

— Interocellar area, vertex, and scutum somewhat shiny; T-I or II often pale marked, female frons length below midocellus 1.9x LID (Fig. 18) ..... ***cladothricis*** Cockerell

16. Frons length below midocellus 1.2-1.3x LID (Fig. 19), wing veins often mostly orange (female) or light brown (male) rather than dark brown to black ..... ***siccatus*** R. Bohart

— Frons length below midocellus 1.7-1.9x LID (Fig. 20), wing veins mostly dark brown to black **17**

17. Mid and hindmetatarsi brown or brownish red (Fig. 26) postocular tubercles small as seen laterally or dorsally, LID in female usually nearly equal to scape length, female scape whitish in front ..... ***inyo*** R. Bohart

— Mid and hindmetatarsi white (Fig. 25), female only known, postocular tubercles large, LID a little broader, scape all whitish ..... ***cucamonga*** Pate

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Belomicrus bridwelli Pate
Fig. 43

Belomicrus bridwelli Pate 1940a:93. Male holotype, Clifton, Fairfax Co., Virginia (PHILADELPHIA), examined.

In addition to the holotype and four topotype paratypes, I have also studied the following: male, Branford, Suwannee Co., Florida, VII-31-30; 2 males, female, Fort Bragg, Cumberland Co., North Carolina; female, Dayton, Rhea Co., Tennessee, VI-20-54; male, 15 mi nw. Big Spring, Howard Co., Texas, VI-13-63. According to these meager records, *bridwelli* occurs east of 102° latitude in May, June, and July. Female squamae and mucro (Fig. 43).

Belomicrus cladothricis (Cockerell)
Fig. 18

Oxybelus cladothricis Cockerell 1895:309. Female lectotype, Las Cruces, New Mexico (PHILADELPHIA), examined. Lectotype designated by Cresson (1928).

Belomicrus cladothricis prosopidis Pate 1940a:72. Male holotype, Palm Springs, Riverside Co., California (PHILADELPHIA), examined.

Belomicrus minidoka Pate 1940a:79. Male holotype, Hagerman, Gooding Co. Idaho (WASHINGTON), examined.

This rather wide-ranging and relatively abundant species is represented in the DAVIS collection by 450 males and 198 females taken at 51 localities during March to October. All of the captures were made south of 41.5° longitude and west of 100° latitude. Outlying states in the range are Nebraska, Texas, Utah, Idaho, and California. Elevations were moderate to low and many were in strictly desert areas. As might be expected of such a common and widespread species, there is a considerable amount of variation. The short and rather broad squamae are a consistent feature. Also, the narrow LID of females (Fig. 18) helps identification. Many western examples have yellow spots on basal terga. Punctation of the scutum and interocellar area is close but allows some shininess not found in several related species such as *eriogoni*. The legs are usually extensively reddish but this occurs in some other species. T-I-II are often reddish in males but II may be all dark brown as in the type of *prosopidis*, or I-II brown as in the type of *minidoka*.

Belomicrus cucamonga Pate
Fig. 25, 31

Belomicrus cucamonga Pate 1940a:76. Female holotype, Camp Baldy, San Gabriel Mts., San Bernardino Co., California (PHILADELPHIA), examined.

In addition to the holotype I have seen three females from Big Pine, Inyo Co., California, VII-10-61 (R. M. Bohart); and a female from Batchelder Springs, Inyo Co., VI-10 (H. K. Court). The more abundant whitish of the scape and tarsi (Fig. 25), as well as the larger postocular tubercles and broader frons, distinguish *cucamonga* from *inyo*. Female squamae and mucro (Fig. 31).

Belomicrus darwini R. Bohart, new species
Fig. 32

Female holotype.—Length 3 mm. Black or dark brown, white are: mandible mostly, scape in front, pronotal lobe, squama, mucro distally; reddish are: clypeal bevel, flagellum (pale orange, spotted laterally), tibia and tarsi mostly (brownish red), hindtibia lighter in basal ring, dull apical bands on T-I to III; wings clear, veins black. Silvery appressed pubescence extending upward along two-thirds of inner eye margin, short supraclypeal patch, weak on genal and mesopleural areas. Punctures of scutum and interocellar area medium fine, slightly separated by microsculpture. LID about 1.4x scape length, frontal suture relatively deep halfway from midocellus to clypeus, clypeal bevel margined and triangular, postocular tubercle small, squamae short and slightly curved (Fig. 32).

Male.—Length 2.5 mm. Scape mostly brownish, flagellum a little spotted laterally as viewed in front.

Holotype female (DAVIS), Darwin Falls, Inyo Co., California, May 17, 1970 (R. M. Bohart). Paratypes, 2 males, 2 females, same data as holotype but collected by E. E. Grissell and R. M. Bohart. Other paratypes, female (DAVIS), Wikiup, Mohave Co., Arizona, IV-11-57 (T. R. Haig); female (RIVERSIDE), Kyle Canyon, Clark Co., Nevada, V-4-41 (P. H. Timberlake); female (DAVIS), near Boron, Clark Co., Nevada, VI-7-41 (P. H. Timberlake).

As indicated in the key, the rather close punctation, moderate LID, brownish legs and terga, short squamae, light orange flagellum, and long frontal suture characterize the species. The flagellum is a little longer and more slender than in other species.

Etymology.—named for Dr. Darwin French, who discovered Darwin Falls in 1860.

Belomicrus eriogoni Pate
Fig. 22

Belomicrus cladothricis eriogoni Pate 1940a:70. Male holotype, San Lucas, Monterey Co., California (PHILADELPHIA), examined.

Belomicrus eriogoni Pate of Bohart and Menke (1976).

I have studied 240 males and 165 females in the DAVIS collection. These were taken during May to September in California, Arizona, New Mexico, Nevada, and Utah. California records are from Mono Co., Lassen Co., Sacramento Co., and Contra Costa Co., south to the Mexican border. Mexican records are from Baja California. At times the species is abundant, especially on the flowers of *Eriogonum fasciculatum*. Female facial proportions (Fig. 22).

Belomicrus inyo R. Bohart, new species
Fig. 20, 26, 28

Female holotype.—Length 2.5 mm. Black, white are: mandible mostly, scape in front, pronotal lobe, squama, foretibia outwardly, mid and hindtibiae on basal one-third; reddish are: clypeal bevel, abdomen (more brownish on T-II to VI); wings clear, veins black. Silvery appressed pubescence is narrow along lower half of inner eye margin, supraclypeal patch conical, moderate on gena and mesopleuron. Punctures of scutum and interocellar area medium fine, slightly separated by microsculpture. LID about equal to scape length (Fig. 20); frontal suture not deep; faintly visible halfway from midocellus to clypeus; clypeal bevel triangular, postocular tubercles small; squamae curved, well separated distally (Fig. 28).

Male.—Length 2.5 mm. Hindtibia mostly orange with dirty white basal area, mid and hindmetatarsi orange or reddish brown. LID about 1.7x scape length.

Holotype female (DAVIS), Antelope Springs, Inyo Co. California, V-10-61 (R. M. Bohart). Paratypes, 2 males, 1 female (DAVIS, BERKELEY), topotypes, VI-29-61, VII-1-61, VIII-24-60, on

Solidago (P. D. Hurd, G. I. Stage).

The orange to brown metatarsi (Fig. 26), dark flagellum, narrow female LID (Fig. 20), basally banded mid and hindtibiae (Fig. 26), close and dull punctation, and well separated squamae (Fig. 28) characterize the species.

Etymology.—specific name is an acronymic noun inspired by Inyo Co., where all of the type series was collected.

Belomicrus istam Pate
Fig. 37

Belomicrus istam Pate 1940a:81. Male holotype, 4.5 mi nw. Edom, Riverside Co., California (PHILADELPHIA), examined.

I have seen a total of 37 males and 62 females collected from March to June in sandy areas of 11 localities. These range in California from Sacramento to Borrego Valley, and in Nevada from Nixon to Stillwater. I collected a long series of both sexes lighting on a sandy slope in Sand Canyon, Kern Co., California, on April 14, 1962. Female squamae and mucro (Fig. 37).

Belomicrus longiceps R. Bohart, new species
Figs. 24, 38

Female holotype.—Length 2 mm. Black, white are: mandible mostly, pedicel partly, pronotal lobe, post-tegula, squama, mucro, tibiae outwardly, tarsi; reddish are: clypeal bevel, abdomen; wings clear, veins brown. Silvery appressed pubescence present along lower half of eye margin, short supraclypeal patch, dense on genal area and mesopleuron. Punctation on scutum and interocellar area fine and close but a little irregular, somewhat shiny. Head unusually long and narrow (Fig. 24), inner eye margins nearly straight (Fig. 24), frontal carina distinct one-third of distance from midocellus to clypeus, LID 1.7x length of scape, clypeal bevel broader than high, postocular tubercle prominent and sharp, genal area flattened to a little concave inside row of erect hairs, squamae short but curved and well separated (Fig. 38).

Male.—length 1.8 mm. T-I-II partly black, T-III-VII black.

Holotype female (DAVIS), 6 mi nw. Adelanto, San Bernardino Co. California, V-11-79, on *Sphaeralcea* (R. M. Bohart). Paratypes collected April to August, 4 males, female (DAVIS, WASHINGTON), 18 mi w. Blythe, Riverside Co., California (M. E. Irwin, F. D. Parker, R. M. Bohart, R. W. Brooks); male (DAVIS), 15 mi w. Baker, San Bernardino Co., California (N. J. Smith); female (BERKELEY), Surprise Canyon, Inyo Co., California (P. D. Hurd); male (DAVIS), Patrick, Washoe Co., Nevada (E. E. Grissell); female (NEW YORK), 2 mi n. Rodeo, Hidalgo Co., Nevada (J. G. Ehrenfeld).

Characteristic are the long head (Fig. 24), dark antenna, sharp postocular tubercles, extensively silvery female gena and mesopleuron, brown wing veins, and unbanded abdomen. The only other species with a rather long head (compare Figs. 21, 24) is the much more abundantly marked *oraibi*, which see.

Belomicrus mescalero Pate
Fig. 34

Belomicrus mescalero Pate 1940a:87. Female holotype, Alamogordo, Otero Co., New Mexico (PHILADELPHIA), examined.

This species is known to occur in April and May. In addition to the three female types, one of which came from Needles, California, I have studied the following: male, female, 3 mi sw. Rodeo, Hidalgo Co., New Mexico, IV-30-65 (J. G. Rozen). The partly polished scutum, together with the dark wing veins, mostly red terga, and whitish-yellow spotted T-I are distinguishing. The male is in general agreement with the female description given by Pate, but T-VI-VII are reddish. Female squamae and mucro are shown in Fig. 34.

Belomicrus oraibi R. Bohart, new species
Figs. 21, 36

Female holotype.—Length 3 mm. Black, white are: mandible mostly, scape in front, pronotal lobe, tegula, post-tegula, metanotum, mucro distally, tibiae and tarsi outwardly (a little reddish), T-I to VI mostly; reddish are: scape partly, flagellum beneath, clypeal bevel, femora distally, tibiae partly, terga basally; wings clear, most veins light orange. Silvery appressed pubescence along lower three-fourths of eye margin, short supraclypeal patch, dense on genal area and mesopleuron. Punctation fine, close and dull on scutum, a little reflec-

tive on interocellar area. Head longer than usual (Fig. 21), inner eye margins nearly straight, frontal carina distinct, LID 1.7x length of scape, clypeal bevel broader than high, postocular tubercles prominent and sharp, genal area slightly concave inside row of erect hairs; squamae short, curved, well separated (Fig. 36).

Male.—Length 2.5 mm. About as in female but T-IV-VI black. Genal area not concave.

Holotype female (DAVIS), Oraibi, Navajo Co., Arizona, VIII-30-76, on *Chrysothamnus* (R. M. Bohart). Paratype female (WASHINGTON), Dinnebito Wash, 5 mi nw. Hotevilla, Navajo Co., Arizona, VIII-31-86 (A. S. Menke); paratype male (DAVIS), 23 mi nw. Page, Kane Co., Utah, VI-22-70 (N. J. Smith); paratype male (SAN FRANCISCO), Green River, 5 mi ne. Jensen, Uinta Co., Utah, VI-26-82 (W. J. Pulawski).

Although generally similar to *longiceps*, which also has an unusually long head, *oraibi* differs by its pale wing veins and extensively white terga. The concavity of the lower gena of the female is even more pronounced. The presumed males from Utah agree with the female in punctation and wing vein color. However, they have T-IV to VI dark. The presently known range includes northern Arizona and southern Utah.

Etymology.—the name is an acronymic noun inspired by the Oraibi indians of Navajo Co., Arizona.

Belomicrus pachappa Pate
Fig. 40

Belomicrus pachappa Pate 1940a:73. Female holotype, Riverside, Riverside Co., California (PHILADELPHIA), examined.

I have studied 11 males and 30 females collected from April to August at 4 localities in California: Weed, Siskiyou Co. (J. Powell); Sand Canyon, Kern Co. (R. M. Bohart); Chuchupate Ranger Station, Ventura Co. (J. Powell, P. D. Hurd); Riverside, Riverside Co. (P. H. Timberlake). Nevada records are from Washoe Co.: Wadsworth (R. M. Bohart, G. I. Stage); Patrick (R. M. Bohart). The 3 species, *pachappa*, *tuktum*, and *istam*, have the squamae elongate and nearly touching distally. The close and dull punctation of *pachappa* separates it. The female has T-I-VI red, but the male has the abdomen dark following T-I or T-II. Female squamae and mucro (Fig. 40).

Belomicrus pallidus R. Bohart, new species
Fig. 23, 33

Male holotype.—Length 2 mm. Black, white are: mandible mostly, antenna mostly but dark distally in front, pronotum all across, tegula and post-tegula, wing veins, squamae and mucro, legs beyond basal two-thirds of femora; reddish are: legs basad of white markings, abdomen; wings clear. Silvery appressed pubescence on face below midocellus except for a median bare spot (Fig. 23), genal and mesopleural areas densely silver, scutum with scattered silvery setae. Punctation fine and sparse on extensively polished mesonotum, a little less so on interocellar area. LID (just above antennal insertion) 1.4x scape length, inner eye margin weakly curved below midocellus (Fig. 23); frontal groove and clypeal bevel (if any) obscured by silvery pubescence; postocular tubercle prominent, sharp; squamae short, curved, pubescent, well separated (Fig. 33).

Female.—Unknown.

Male holotype (SAN FRANCISCO), Borrego, San Diego Co., California IV-25-54 (P. D. Hurd). Paratype male (DAVIS), Blythe, Riverside Co., California, on *Asclepias*, VII-8-56 (M. Wasbauer).

The rather extensive silvery pubescence is reminiscent of *sechi*, but there are many points of difference, one of which is the simple scape in *pallidus* male. General features characterizing *pallidus* are the considerably polished mesonotum, whitish wing veins, and red and white legs.

Etymology.—specific name based on the Latin adjective *pallidus* = pale.

Belomicrus potawatomi Pate
Fig. 41

Belomicrus potawatomi Pate 1947:57. Female holotype, Sioux City, Woodbury Co., Iowa (WASHINGTON), examined.

The holotype was collected July 12, 1935 by C. N. Ainslee. The only other record of which I am aware is: female, Regnier, Cimarron Co., Oklahoma, June 9 (NEW YORK). This species is similar to *bridwelli* which also has the squamae far apart. However, the metanotum is posteriorly pointed (compare Figs. 41, 43) in *bridwelli* and its scutal punctation is less coarse.

Belomicrus sechi Pate
Figs. 27, 30

Belomicrus sechi Pate 1940a:60. Male holotype, 6 mi n. Palm Springs, Riverside Co. California (PHILADELPHIA), examined.

I have seen 17 males and five females of this extensively silvery pubescent species. They were taken from May to August in the following desert localities of southern California: Palm Springs, Magnesia Canyon, and Rancho Mirage, all Riverside Co.; 11 mi w. Ludlow, San Bernardino Co.; and Borrego Valley, San Diego Co.; a male (SAN FRANCISCO) comes from Arizona: Roper Lake State Park, Graham Co., V-26-83 (W. J. Pulawski). The male has a unique, distally swollen scape (Fig. 27). Otherwise, the female agrees with the description given by Pate. The female squamae and mucro are shown in Fig. 30.

Belomicrus siccatus R. Bohart, new species
Figs. 19, 29

Female holotype.—Length 2.5 mm. Black, white are: mandible basally, pronotal tubercle, squamae, mucro distally; light dull orange are: wing veins, tibiae and tarsi; dark red are: T-I-II, pygidium; wing membrane clear. Silvery appressed pubescence in a broad patch reaching up along two-thirds of inner eye margin, supraclypeal patch undeveloped, postocular and mesopleural patches moderate. Punctation of scutum and interocellar area fine and a little separated, somewhat shiny. LID 2x scape length, inner eye margin gently curved (Fig. 19), postocular tubercles present but not sharp, squamae nearly straight (Fig. 29).

Holotype female (DAVIS), Thousand Palms Canyon, Riverside Co., California, IV-9-64 (R. M. Bohart). Paratypes, from Riverside Co.: 2 males (DAVIS), Whitewater, IV-17-87 (N. J. Smith); 7 males (DAVIS), SAN FRANCISCO, WASHINGTON), same data as holotype; 2 male topotypes (DAVIS), III-29-77 (R. M. Bohart, N. J. Smith); 2 male topotypes (DAVIS), III-31-63 (F. D. Parker); female topotype (DAVIS), IV-11-70 (R. M. Bohart). Also a paratype female (RIVERSIDE), Apple Valley, San Bernardino Co., California, V-20-41 (P. H. Timberlake).

The combination of unusually broad frons (Fig. 19) black flagellum, nearly straight squamae (Fig. 29) orange (female) to brownish (male) wing veins, and orange-tinted leg markings characterize the species.

Etymology.—specific name derived from the Latin adjective *siccus* = dry.

Belomicrus timberlakei Pate
Fig. 35

Belomicrus timberlakei Pate 1940a:91. Male holotype, Riverside, Riverside Co., California (PHILADELPHIA), examined.

This species has been collected from April to September. I have studied 41 males and 11 females from California, Nevada, Utah, Arizona, and New Mexico. In California 13 localities range from Siskiyou Co. to Riverside Co., mostly in the Transition Life Zone. One record is at 8,000 ft. on Carson Pass, Alpine Co. Non-California records are: Cochise Co., Arizona (Willcox, Apache, Santa Rita Mts.); Eureka Co., Nevada (Eureka); Churchill Co. Nevada (Frenchman); Grant Co., Utah (Moab); Emery Co. Utah (Greenriver); Hidalgo Co., New Mexico (Rodeo); Baja California, Mexico (10 mi e. San Quintin).

Of the 3 species with all dark pronotum (*timberlakei*, *potawatomi* and *bridwelli*) only *timberlakei* has the squamae only moderately separated (Fig. 35). The female resembles the male in nearly all respects but its LID equals 2x the scape length instead of 1.7.

Belomicrus tuktum Pate
Fig. 39

Belomicrus tuktum Pate 1940a:84. Male holotype 5 mi e. Edom, Riverside Co., California (PHILADELPHIA), examined.

In addition to the holotype I have studied 24 males and 25 females collected from March to May. The 13 localities represented include the following California counties: Inyo (Darwin Falls, Little Lake, Surprise Canyon), Kern (Sand Canyon), Ventura (Quatal Canyon), Riverside (Thousand Palms, Deep Canyon, 18 mi w. Blythe, Whitewater Canyon), San Bernardino (5 mi n. Barstow), Imperial (Glamis), and San Diego (Borrego Valley). This species is quite similar to *istam*. Females have the abdomen essentially all dark red, but males usually have T-I dark red, the rest brown. Female squamae and mucro are shown in Fig. 39.

Belomicrus vierecki Pate
Fig. 42

Belomicrus vierecki Pate 1940a:56. Male holotype, Alamogordo, Otero Co., New Mexico (PHILADELPHIA), examined.

This is a relatively abundant and widespread species. I have seen 272 males and 47 females collected from March to July. I swept a long series from flowers of *Chilopsis linearis* at 15 mi w. Baker, San Bernardino Co., California in May. Other preferred hosts are *Cercidium* and *Prosopis*. The 15 localities for California are all sandy situations at low elevations south of 38.6 longitude. Arizona records are from Wickenburg, Tucson, and Santa Rita Mts. New Mexico records are Alamogordo, Las Cruces, and near Laguna, Valencia Co. Mexican material has been seen from Sonora (Alamos), Puebla (Petlalcingo), Durango (Nombre de Dios), and Baja California Sur (La Ribera). The most eastern record in the United States is Presidio, Texas at about 104.5° latitude.

The dark brown abdomen, white tibiae and tarsi, extensively polished interocellar area, narrow LID, and well separated crescentic squamae (Fig. 42), make identification relatively simple.

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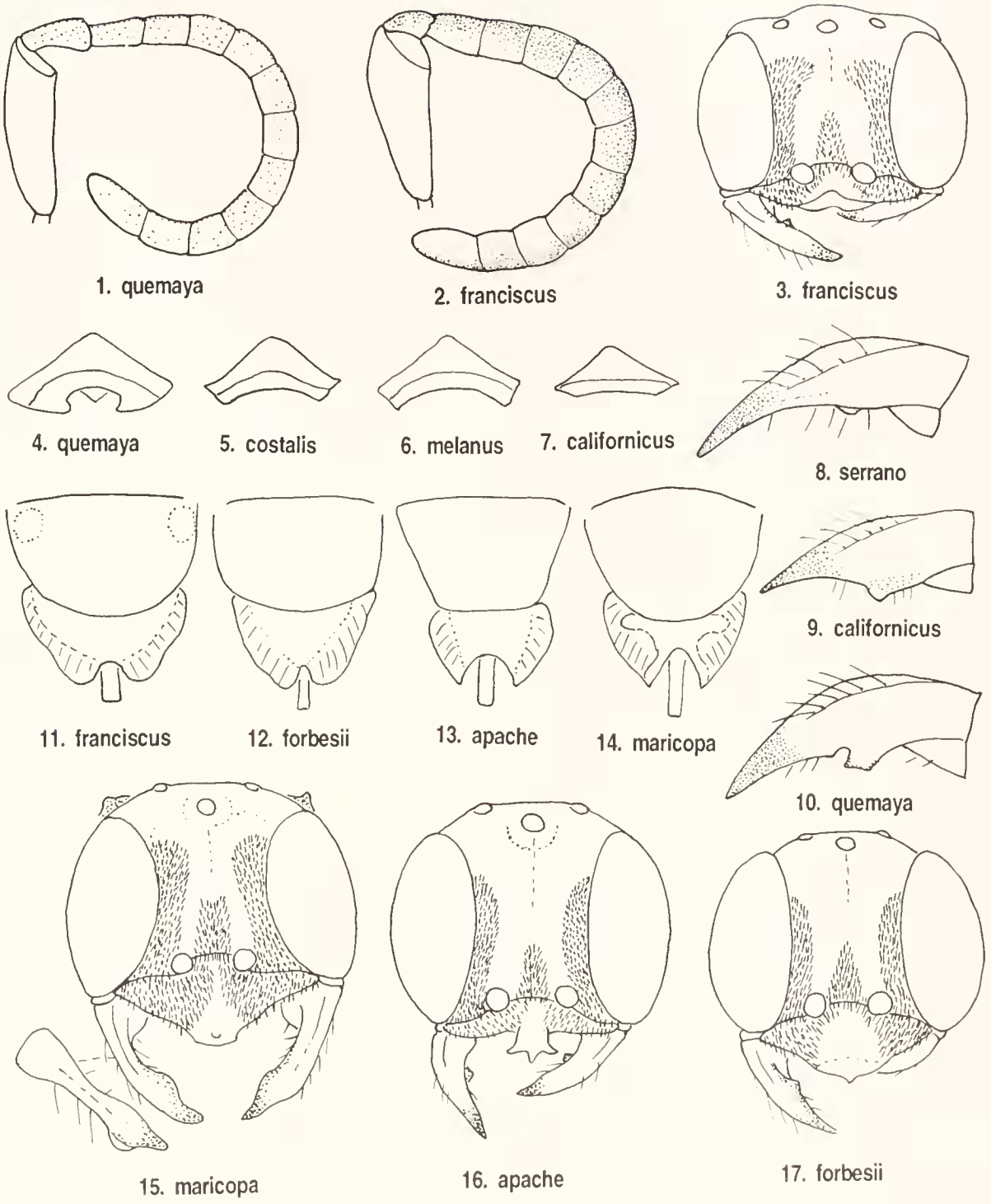
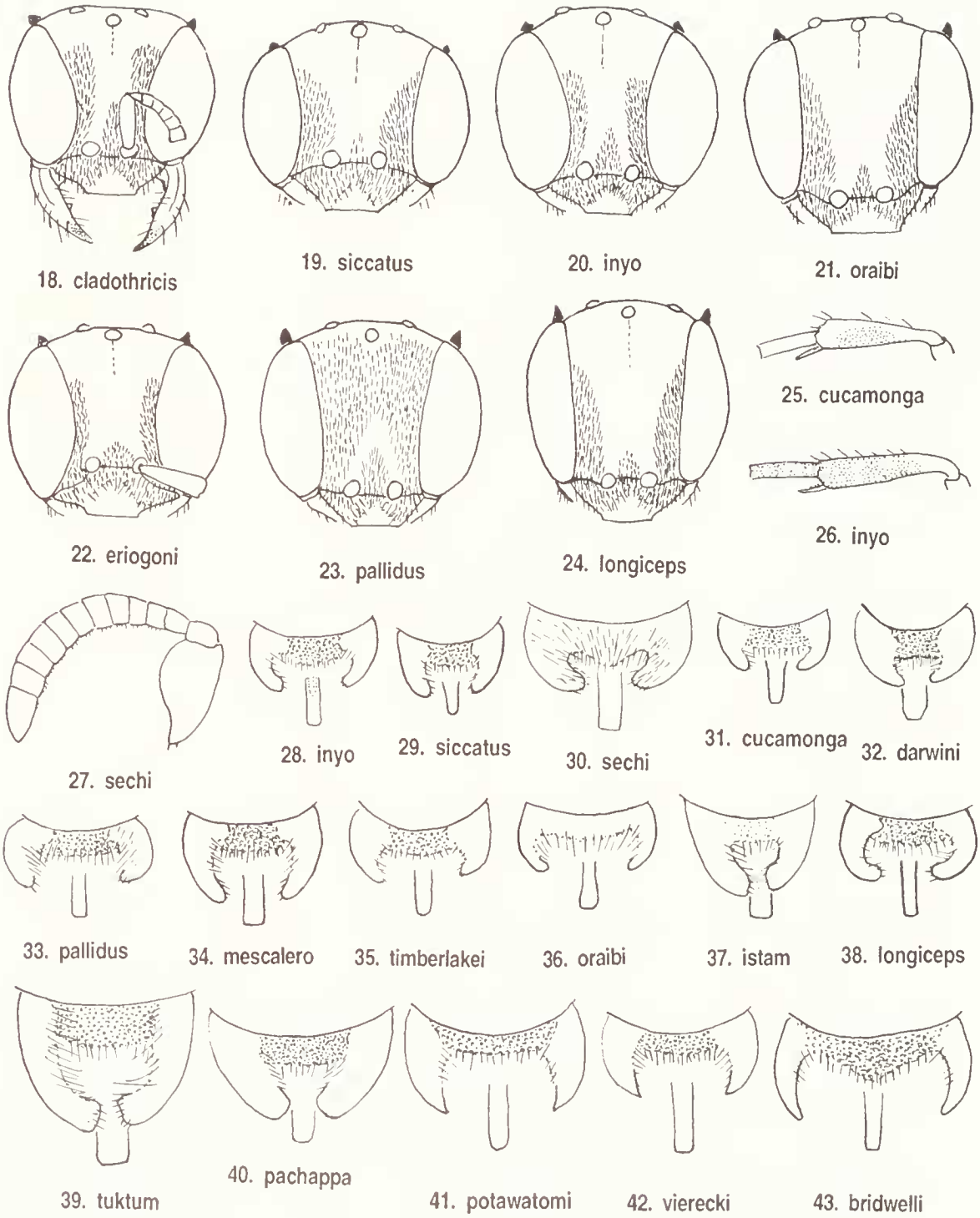


Figs. 1-17. 1, 2, male antenna x100; 3, female face; 4-7, male clypeus, anterior view x100; 8-10, female mandible x75; 11-14, female scutellum, squamae, and mucro, not to scale; 15-17, female face, not to scale.



Figs. 18-24, female face x50; 25-26, female hindtibia and metatarsus x50; 27, male antenna x100; 28-43, female squamae and mucro, dorsal x100. Silvery scales on face and squamae shown as dark setal areas.